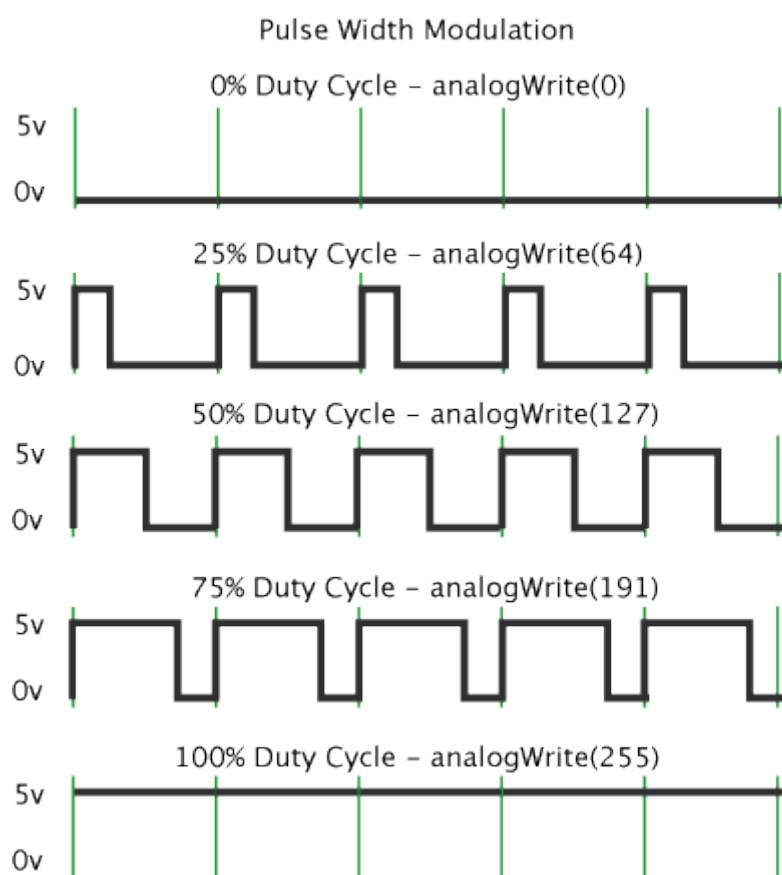


4CS016 Embedded Systems Programming Workbook 6



<http://provideyourown.com/2011/analogwrite-convert-pwm-to-voltage/>

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Introduction

This workbook complements the lectures for 4CS016 as such, the lecture notes will be referred to as the work progresses. You will also need to complete portfolio activities as you progress, these are highlighted as you go along.

Lab 1. Getting Started with PWM

- The Analogue pins of the Arduino can only be used for
 - Analogue input
 - As digital pins i.e.
 - `pinMode(A0, OUTPUT);`//where A0, A1 etc are the pins
 - `digitalWrite(A0, HIGH);`
- So how do we output analogue values?
- We use Pins set up for Pulse Width Modulation (PWM)

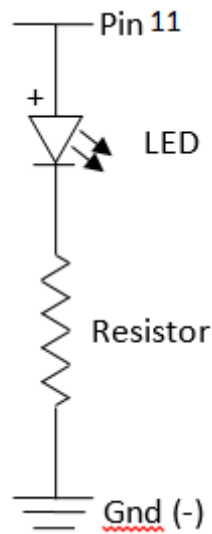


Digital Pins, 3,5,6,9,10,11

Arduino PWM is between 0 (off) and 255 (on full, equivalent to 5v).

Step 1: Read the information on PWM.

Step 2: Connect an LED and resistor as shown below, BUT connect the positive lead of the LED to pin 11. Then follow the code below.



```

Fadinginandout | Arduino 0019
File Edit Sketch Tools Help

Fadinginandout

#define pwmOut 11
int brightness = 0; // Begin with LED off
int fadeAmount = 5; // This will be used to alter the pulse width

void setup() {
  pinMode(pwmOut, OUTPUT);
}

void loop() {
  analogWrite(pwmOut, brightness);
  brightness = brightness + fadeAmount;
  // if brightness is 0, or brightness is max, invert fadeAmount
  if (brightness == 0 || brightness == 255) {
    fadeAmount = -fadeAmount ;
  }
  // wait a bit
  delay(100);
}

Done Saving.
Binary sketch size: 1228 bytes (of a 30720 byte maximum)
16

```

Can you remember the value of resistor to use?

Step 3: Now use a potentiometer to control the brightness of the LED. Hints below.

1. Use one of the ANALOG IN pins to read the potentiometer value.
2. ANALOG IN pins can only act as analogue inputs. You don't need to use pinMode in the setup loop for them.
3. You'll need to use the 'analogRead' function. This has a higher resolution than 'analogWrite'. Input voltages are read as a value between 0 and 1024
4. The potentiometer has three pins. The outside two are connected to ground and 5v (Doesn't matter which is which, but not to the same one please!). The voltage output from the centre pin varies as you turn the knob.

Complete Activity 6.1 of the Portfolio

End of Lab 1

End of Workbook 6